Synopsis
Phytochemical Investigation and Biological Evaluation of
Some Indian Medicinal Plants

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Submitted by

Mrs. ARCHANA SWAMY. P, M.Pharm.

Under the Supervision of

Dr. V. GIRIJA SASTRY, M.Pharm., Ph.D.

UNIVERSITY COLLEGE OF PHARMACEUTICAL SCIENCES

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SYNOPSIS

Aims and objective

Natural products have been playing a vital role in health care for decades. Of the different sources of natural products, plants have been a source of chemical substance, which serves as drugs in their own right or key ingredients in formulation containing synthetic drugs. The process that leads from the plant to pharmacologically active, pure constituent is every long and tedious and requires a multidisciplinary approach. The selection of the plant species is a crucial factor for the ultimate success of investigation. Through random selection gives some hint, targeted collection based on chemotaxonomic relationships and ethnomedical information derived from Tradition Medicine are more likely to yield pharmacologically active compounds.

Though the advances in modern medicines are significant, there remains an ever increasing demand for herbal medicines. Effective and potent herbal medicines require evaluation by standard scientific methods so as to be validated for the treatment of diseases. The presents of patent laws have increased the necessity to preserve the claims of these time-tested folk medicines. Thus, it has become imperative to initiate steps to document components and activity of these medicinal plants.

The pancreas is comprised of separate functional units that regulate two major physiological functions these are digestion and glucose metabolism. The effects of diabetes mellitus include long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, heart, and blood vessels. Diabetes may present with characteristic symptoms such as thirst, polyuria, blurring of vision, weight loss, and

polyphagia, and in its most severe forms, with ketoacidosis or nonketotic hyperosmolarity, which, in the absence of effective treatment, leads to stupor, coma, and death. Often symptoms are not severe or may even be absent. The number of adults with diabetes in the world are estimated to rise from 135 million in 1995 to 300 million in 2025. An estimated 150 million people have T2DM globally. This figure is expected to double by 2025. The WHO estimates that 75 percent of the 300 million adults with diabetes in 2025 will live in developing countries. It's projected that the number of people with diabetes in developed countries will rise 42%, from 51 million in 1995 to 72 million in 2025. The number of people in developing countries with diabetes will increase by more than 2.5 times (170 %), from 84 million in 1995 to 228 million in 2025. Hence, in the present study, we were interested in carrying out a systemic phytochemical, biological, pharmacological evaluation of *Mollugo oppositifolia, Smilax perfolita and Flemingia wightiania* which were used traditionally for the treatment of anti diabetes.

Chapter I

The general introduction of natural chemistry and importance of present research work was given and also brief introduction on phyto constituents were presented. Introduction to plants sources of drugs and some important medicinal plants used drugs and their traditional use in treating diseases.

Chapter II

In this chapter gives detailed literature survey that is made on the selected plats *Mollugo oppositifolia*, *Smilax Perfoliata* and *Flemingia wightiania*. A careful study of literature revealed that on work is done on the whole plant of *Mollugo oppositifolia*. A

brief review on smilax species which includes phytochemical constituents, biological activities and uses previously reported from other species and also literature review on *smilax perfoliata* were included literature. Regarding the plant *Flemingia wightiana* the literature study revealed that phytochemical constituents, biological activities and uses previously reported from the species.

Chapter III

Chapter-III deals with the present work on *Mollugo oppositifolia*. The process of extraction from the dried plant material of *Mollugo oppositifolia*, isolation and characterization of the compounds from the methanolic extract of whole plant of *Mollugo oppositifolia* are documented in this chapter.

Compound **MO-01** was obtained as white needles from 25% ethylacetate-hexane fraction and has a molecular formula $\mathbf{C_{35}H_{60}O_6}$, m.p. 280-282°C. It gave positive result for LB test for sterols. MO-01 was characterized as β-sitosterol glucoside.

Compound **MO-02** was obtained as Flourescent yellow powder from 75% ethyl acetate–methanol fraction and has a molecular formula $\mathbf{C_{21}H_{19}O_{10}}$, m.p - 236°C. It gave positive result for Schinoda test for flavonoids. MO-02 was characterized as vitexin.

Compound **MO-03** was obtained from 35% ethyl acetate –methanol fraction. It was obtained as Dark brownish Crystals, having melting point 260-262^{0}C. It showed positive for Molisch'test, Saponin's test. MO-03 was not characterized due to paucity of sample.

Chapter IV

The n-Hexane, ethyl acetate, methanol and aqueous extracts of *Mollugo oppositifolia* shows significant zone of inhibition against bacteria and fungi.

In this study the n-Hexane, Ethyl acetate, Methanol and Aqueous extracts of *Mollugo oppositifolia* is evaluated for its Analgesic activity of acetic acid induced writhing in mice, tail flick method in rats and hot plate method in mice. The methanol and aqueous extracts produced significantly analgesic activity. n-Hexane and ethyl acetate extracts showed less activity.

Anti-inflammatory activity evaluated was acute and chronic models of inflammation. The acute inflammatory property the formalin induced paw oedema in rats was employed and for acute anti-inflammatory activity, formalin-induced paw oedema in rats was used. The result of study showed that methanol and aqueous extracts of *Mollugo oppositifolia* has showed significantly acute anti inflammatory activity. It also showed significantly chronic anti inflammatory activity. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts.

The effect of extracts was investigated in normal rats and glucose over loaded rats. The extracts were subjected to comparative evaluation of antidiabetic activity in STZ (45 mg/kg) induced diabetic rats for a period of 21 days. The extracts showed a significant glycemic control effect in normal rats and glucose over loaded rats. The methanol and aqueous extracts showed a significant reduced in the blood glucose levels, lipid profile and serum biomarkers in diabetic rats. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts. The extracts also showed a

correspondent effect in enzymatic and non-enzymatic levels in diabetic rats. The whole plant of *Mollugo oppositifolia* extracts showed an increased β-cell mass in islets of pancreas.

Overall the whole plant extracts of *Mollugo oppositifolia* are having anti-microbial, analgesic, anti-inflammatory and anti-diabetic effect and also antioxidant activity in diabetic rats.

Chapter V

In this chapter phytochemical screening of the ethyl acetate extract of the entire plant of *Smilax perfoliata* and the experimental work on *Smilax perfoliata* were described. The extraction, isolation and characterization of the compounds from the ethyl acetate extract of this plant are documented in this chapter.

From the experimental work column chromatography afforded two compounds designated as SP-01 and SP-02. These compounds were identified as 1,3,6,8 tetra hydroxy anthraquinone and Rutin by spectral studies and by comparison with authenticated sample.

Chapter VI

The n-Hexane, ethyl acetate, methanol and aqueous extracts of *Smilax Perfoliata* shows significant zone of inhibition against bacteria and fungi.

In this study the n-Hexane, ethyl acetate, methanol and aqueous extracts of *Smilax Perfoliata* is evaluated for its Analgesic activity of acetic acid induced writhing in mice, tail flick method in rats and hot plate method in mice. The aqueous and methanol extracts

produced significantly analgesic activity. n-Hexane and ethyl acetate extracts showed less activity.

Anti-inflammatory activity evaluated was acute and chronic models of inflammation. The acute inflammatory property the formalin induced paw oedema in rats was employed and for acute anti-inflammatory activity, formalin-induced paw oedema in rats was used. The result of study showed that aqueous and methanol extracts of *Smilax Perfoliata* has showed significantly acute anti inflammatory activity. It also showed significantly chronic anti inflammatory activity. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts.

The effect of extracts was investigated in normal rats and glucose over loaded rats. The extracts were subjected to comparative evaluation of antidiabetic activity in STZ (45 mg/kg) induced diabetic rats for a period of 21 days. The extracts showed a significant glycemic control effect in normal rats and glucose over loaded rats. The aqueous and methanol extracts showed a significant reduced in the blood glucose levels, lipid profile and serum biomarkers in diabetic rats. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts. The extracts also showed a correspondent effect in enzymatic and non-enzymatic levels in diabetic rats. The whole plant of *Smilax Perfoliata* extracts showed an increased β-cell mass in islets of pancreas.

Overall the whole plant extracts of *Smilax Perfoliata* are having anti- microbial, analgesic, anti-inflammatory and anti-diabetic effect and also antioxidant activity in diabetic rats.

Chapter VII

In this chapter phytochemical examination of the extract of the entire plant *Flemingia wightiana* and the experimental work on *Flemingia wightiana* were described. The extraction, isolation and characterization of the compounds from the ethyl acetate extract of this plant are documented in this chapter. From the experimental work on column chromatography afforded two compounds designated as FW1, FW-2. These compounds were identified neo Flemingin –D, quercetin by spectral studies and by comparison with authenticated sample.

Chapter VIII

The n-Hexane, Ethyl acetate, Methanol and Aqueous extracts of *Flemingia wightiania* shows significant zone of inhibition against bacteria and fungi.

In this study the n-Hexane, Ethyl acetate, Methanol and Aqueous extracts of *Flemingia wightiania* is evaluated for its Analgesic activity of acetic acid induced writhing in mice, tail flick method in rats and hot plate method in mice. The methanol and aqueous extracts produced significantly analgesic activity. n-Hexane and ethyl acetate extracts showed less activity.

Anti-inflammatory activity evaluated was acute and chronic models of inflammation. The acute inflammatory property the formalin induced paw oedema in rats was employed and for acute anti-inflammatory activity, formalin-induced paw oedema in rats was used. The result of study showed that methanol and aqueous extracts of *Flemingia wightiania* has showed significantly acute anti inflammatory activity. It also

showed significantly chronic anti inflammatory activity. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts.

The effect of extracts was investigated in normal rats and glucose over loaded rats. The extracts were subjected to comparative evaluation of antidiabetic activity in STZ (45 mg/kg) induced diabetic rats for a period of 21 days. The extracts showed a significant glycemic control effect in normal rats and glucose over loaded rats. The methanol and aqueous extracts showed a significant reduced in the blood glucose levels, lipid profile and serum biomarkers in diabetic rats. n-Hexane and ethyl acetate extracts showed a less effect compare to the other two extracts. The extracts also showed a correspondent effect in enzymatic and non-enzymatic levels in diabetic rats. The whole plant of *Flemingia wightiania* extracts showed an increased β-cell mass in islets of pancreas.

Overall the whole plant extracts of *Flemingia wightiania* are having anti-microbial, analgesic, anti-inflammatory and anti-diabetic effect and also antioxidant activity in diabetic rats.

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